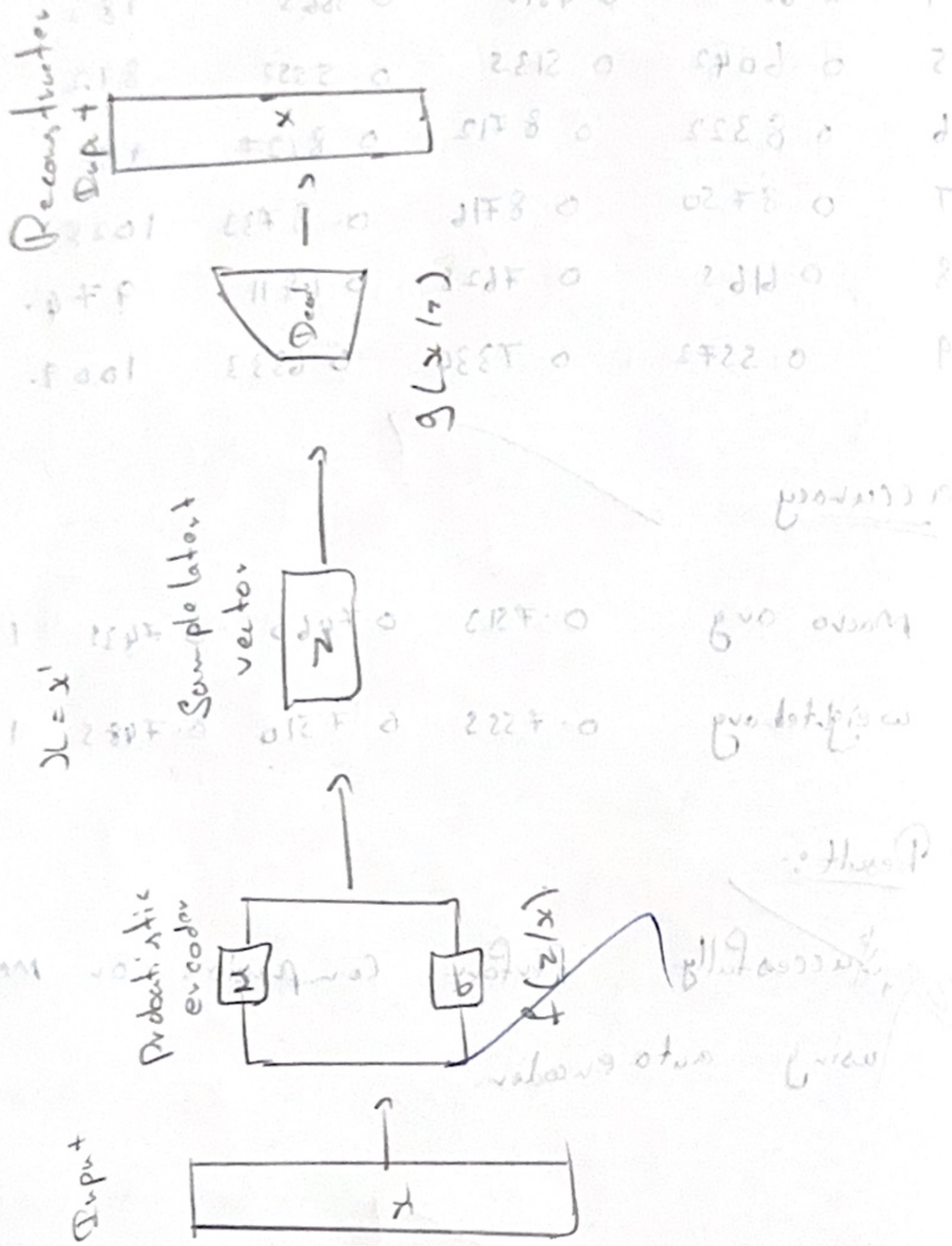


Exp 3 :-

Experiment Using Variational Encoder

Aim :- To implement and evaluate a variational Autoencoder (VAE) dimensionality reduction and feature extraction, followed by a classifier trained on the learned image classification.

objective :-

1.) Understand the architecture and working of a variational Autoencoder.

2.) Train the VAE on image dataset (eg:- MNIST).

3.) Extract latent-space features from the encoder.

4.) Train classifier using latent features.

5.) Evaluate the model.

Pseudocode :-

1.) Import required libraries.

2.) load dataset

3.) Define VAE architecture.

- Encoder :- maps input → mean (μ) and log variance ($\log\sigma$)
- Decoder :- reconstructs image from z.

4.) Train the VAE for several epochs.

5.) Extract latent features (z) for all training testSet

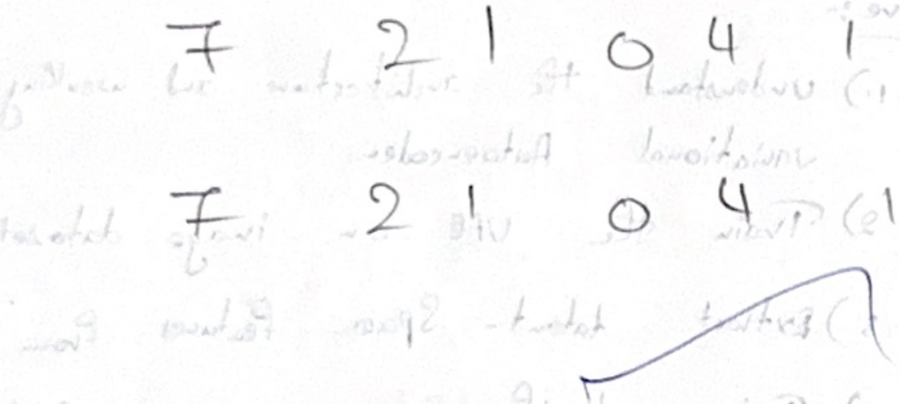
6.) Train a simple classifier on latent z.

7.) Predict test data labels.

8.) Compute classification matrixs :-

- Accuracy.
- classification.
- Confusion Matrix.

Original (top) vs Reconstructed (bellow)



classification Report :-

	Precision	recall	F1 Score	Support
0	0.91	0.94	0.93	980
1	0.95	0.96	0.96	1135
2	0.87	0.84	0.85	1032
3	0.87	0.90	0.89	1040
4	0.89	0.92	0.90	982
5	0.85	083	0.84	892
6	0.90	0.91	0.90	988
7	0.91	0.88	0.89	1028
8	0.85	0.84	0.85	974
9	0.87	0.86	0.86	1009

Accuracy: -

Macro Avg	0.89	0.89	0.89	10000
weight ~~Macro~~ Avg	0.89	0.89	0.89	10000

Result:-

Successfully Completed on expenats using Variational AutoEncoder (VAE).